

#4

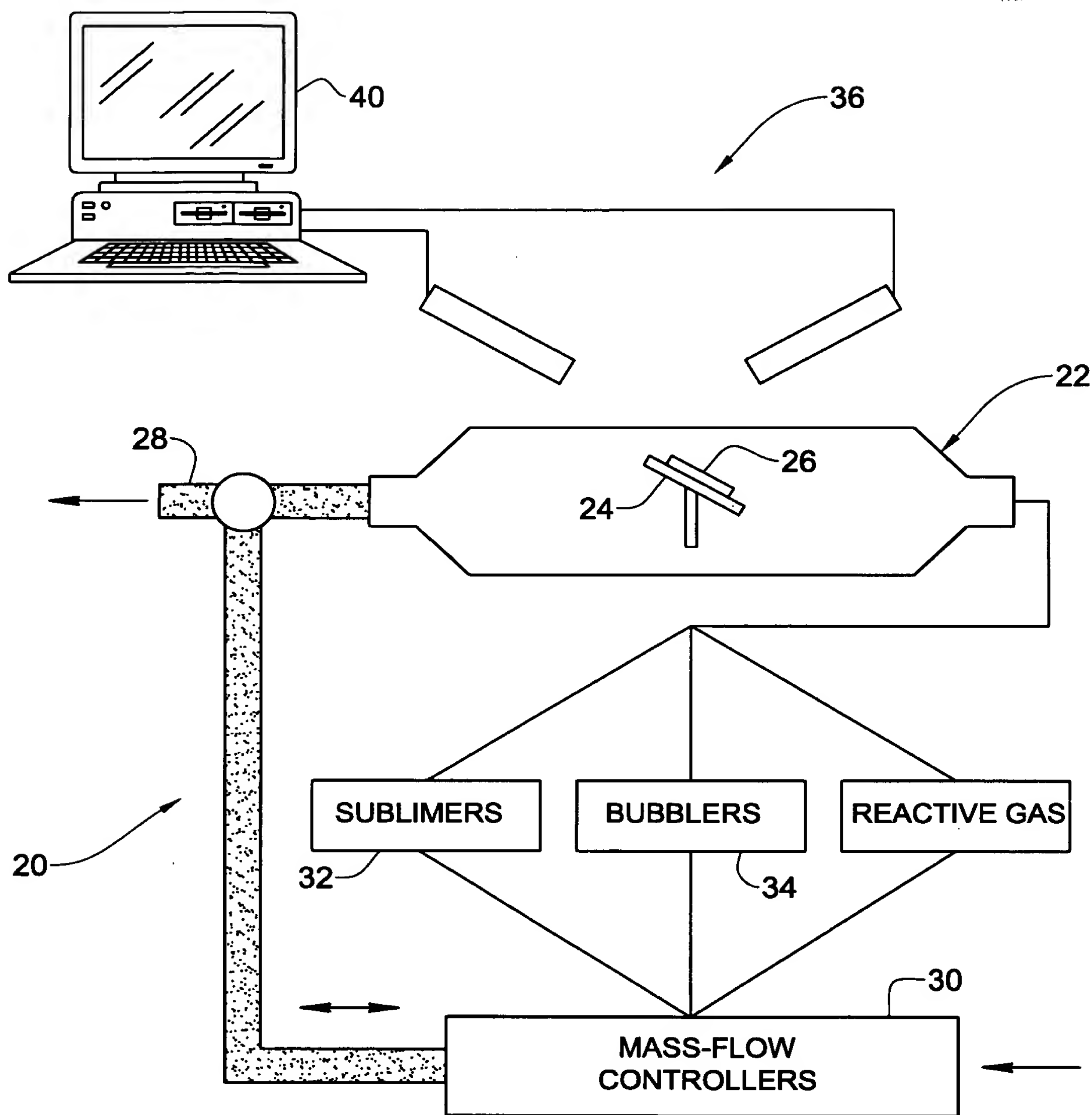


FIG. 1

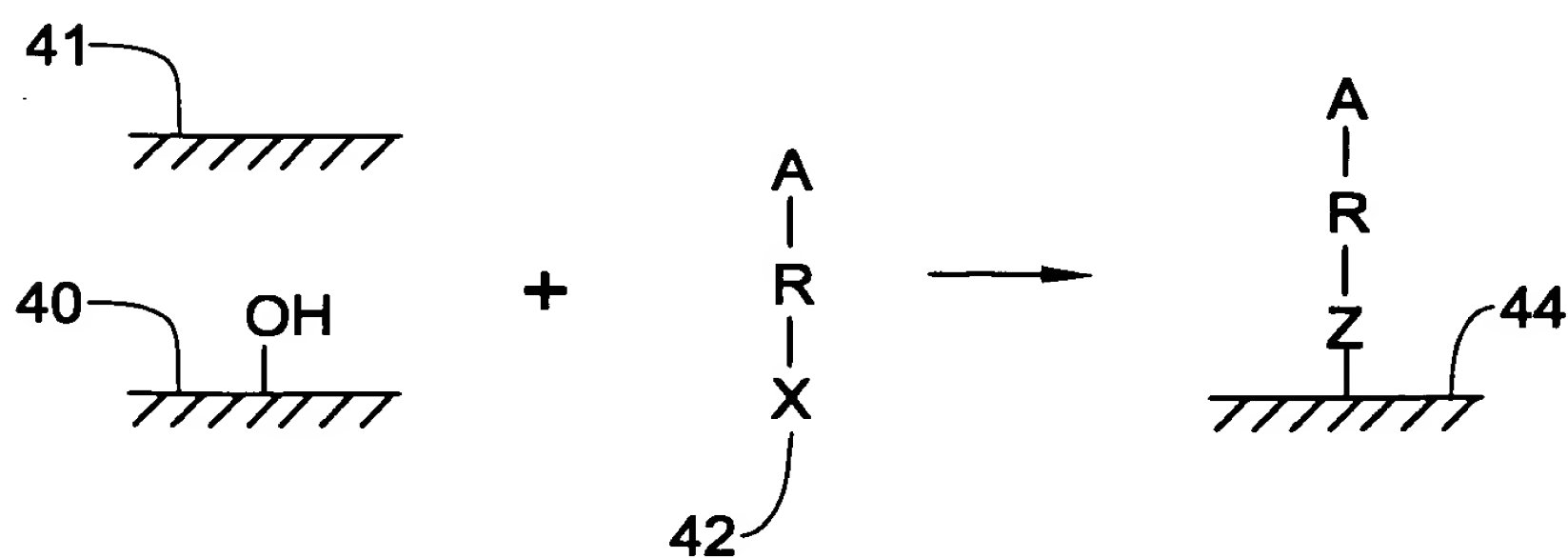
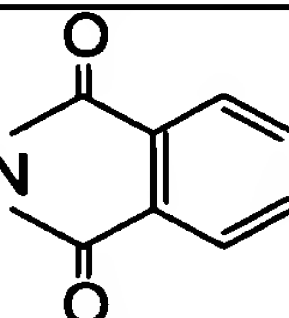
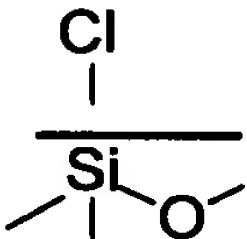
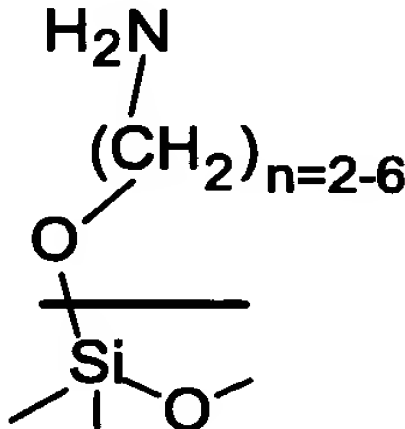
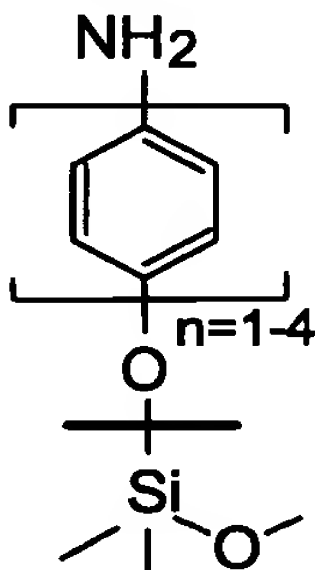
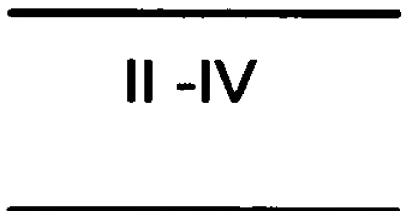
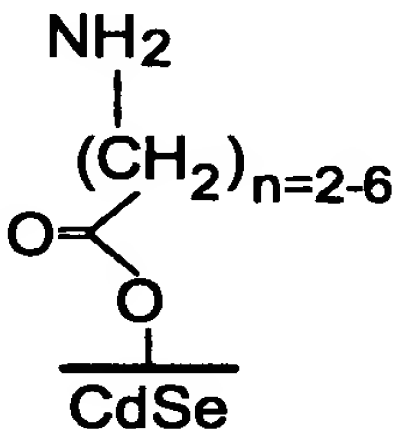
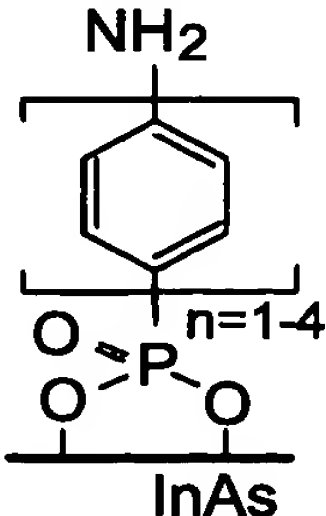


FIG. 2A

Substrate	Coupling Agent (X=silane or thiol)	Template Layer (Z=siloxane or metal sulfide)
$\begin{array}{c} \text{OH} \\   \\ \text{---} \\ \text{MO}_x \\ \text{M= Si, Ti, In, Fe, ...} \end{array}$ <p>40</p>	$\begin{array}{c} \text{A} \\   \\ \text{R} \\   \\ \text{SiY}_3 \end{array}$ <p>A= NH<sub>2</sub> or  R= alkyl or phenyl Y= halogen or alkoxy</p> <p>42</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{H}_2\text{N} \\   \\ (\text{CH}_2)_{n=2-6} \\   \\ \text{Si} \begin{array}{l} \diagup \text{O} \diagdown \end{array} \\   \\ \text{O} \\   \\ \text{---} \end{array}</math> <p>44</p> </div> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{NH}_2 \\   \\ \text{---} \\   \\ \text{Si} \begin{array}{l} \diagup \text{O} \diagdown \end{array} \\   \\ \text{O} \\   \\ \text{---} \end{array}</math> <p>44</p> </div> </div>
$\begin{array}{c} \text{---} \\ \text{M or MM}' \\ \text{M= Au, Pt, Cu, ...} \\ \text{MM}'= \text{GaAs, CdSe, ...} \end{array}$ <p>41</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{NH}_2 \\   \\ \text{R} \\   \\ \text{SH} \end{array}</math> </div> <div>or</div> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{NH}_2 \quad \text{NH}_2 \\   \quad   \\ \text{R} \quad \text{R} \\   \quad   \\ \text{S} \text{ --- } \text{S} \end{array}</math> <p>R= alkyl or phenyl</p> </div> </div> <p>42</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{NH}_2 \\   \\ (\text{CH}_2)_{n=2-6} \\   \\ \text{S} \\   \\ \text{---} \end{array}</math> <p>44</p> </div> <div style="text-align: center;"> <math display="block">\begin{array}{c} \text{NH}_2 \\   \\ \text{---} \\   \\ \text{S} \end{array}</math> <p>44</p> </div> </div>

**FIG. 2B**

Substrate	Coupling Agent (X= OH,CO <sub>2</sub> H, PO <sub>3</sub> H <sub>2</sub> )	Template Layer (Z= alkoxyasilane, phosphate or carboxylate)
 <p style="text-align: center;">40</p>	<p>HO - R - NH<sub>2</sub></p> <p>R= alkyl or phenyl</p> <p style="text-align: center;">42</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>44</p> </div> <div style="text-align: center;">  <p>44</p> </div> </div>
<div style="text-align: center;">  <p>41</p> </div>	<p>HOOC - R - NH<sub>2</sub></p> <p>(HO)<sub>2</sub>OP - R - NH<sub>2</sub></p> <p>R= alkyl or phenyl</p> <p style="text-align: center;">42</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>44</p> </div> <div style="text-align: center;">  <p>44</p> </div> </div>

**FIG. 2B CONT**

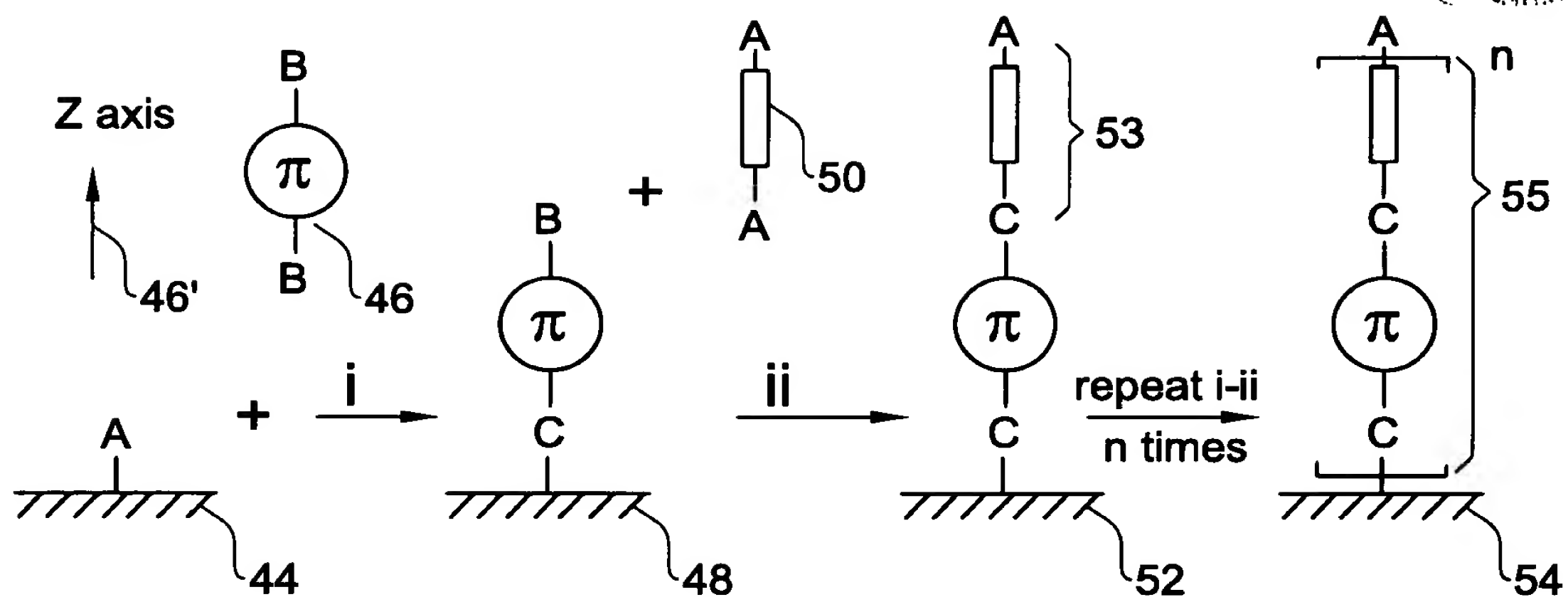


FIG. 3A

A	B	C	INS./SC	COND./SC	
$-\text{NH}_2$					INS/COND
$\text{R}-\text{CH}(\text{NH}_2)_2$			$-(\text{CH}_2)_n-$ $n=1-12$	 $n=1-6$ oligothiophene	
$-\text{NH}_2$	$\text{C}=\text{O}$	$\text{C}=\text{N}-$	 $n=0-5$	 $n=1-6$ oligoaniline	
$-\text{SiCl}_3$	$-\text{OH}$				SC/SC
	$-\text{OH}$		naphtalene perylene terylene anthracene pentacene	porphyrine phthalocyanine	

FIG. 3B

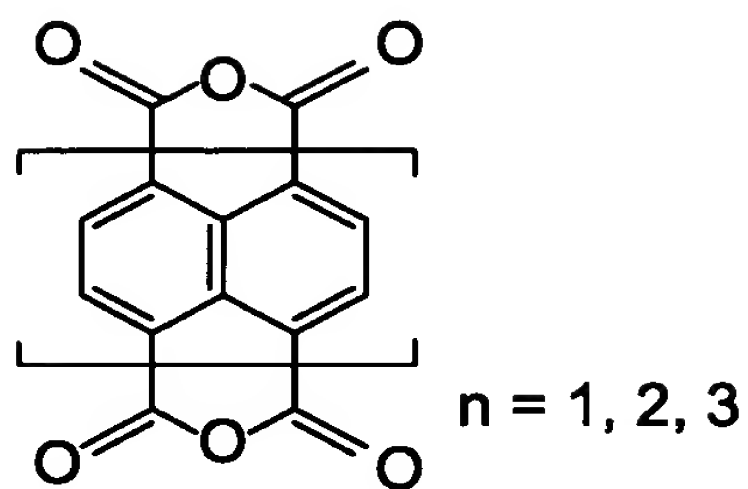
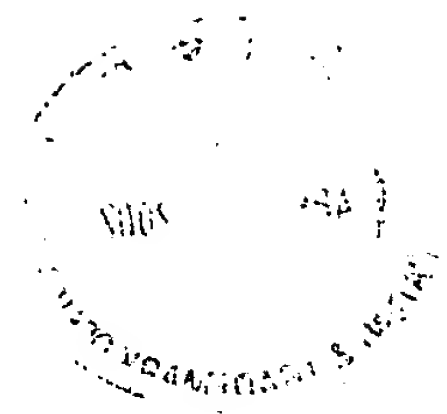


FIG. 4A

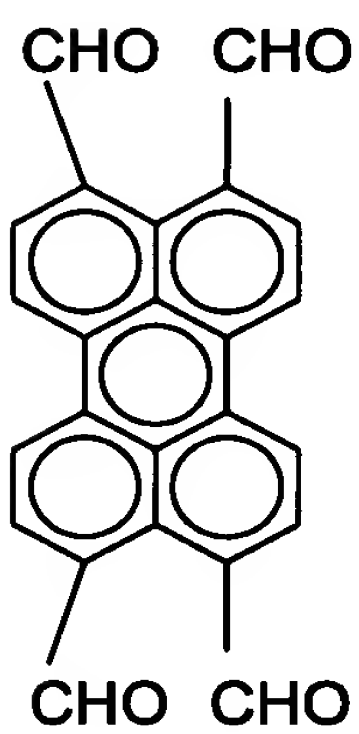


FIG. 4B

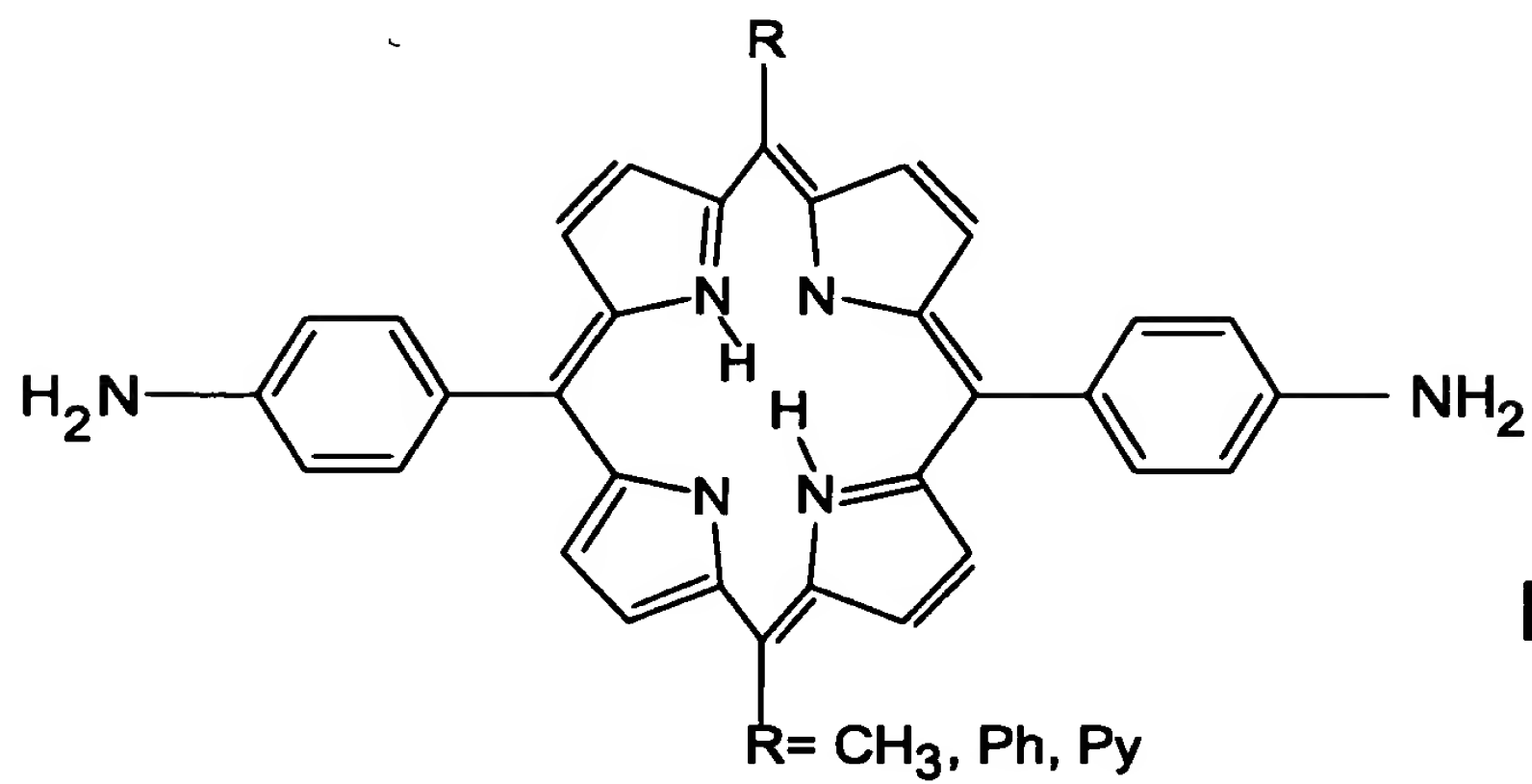


FIG. 4C

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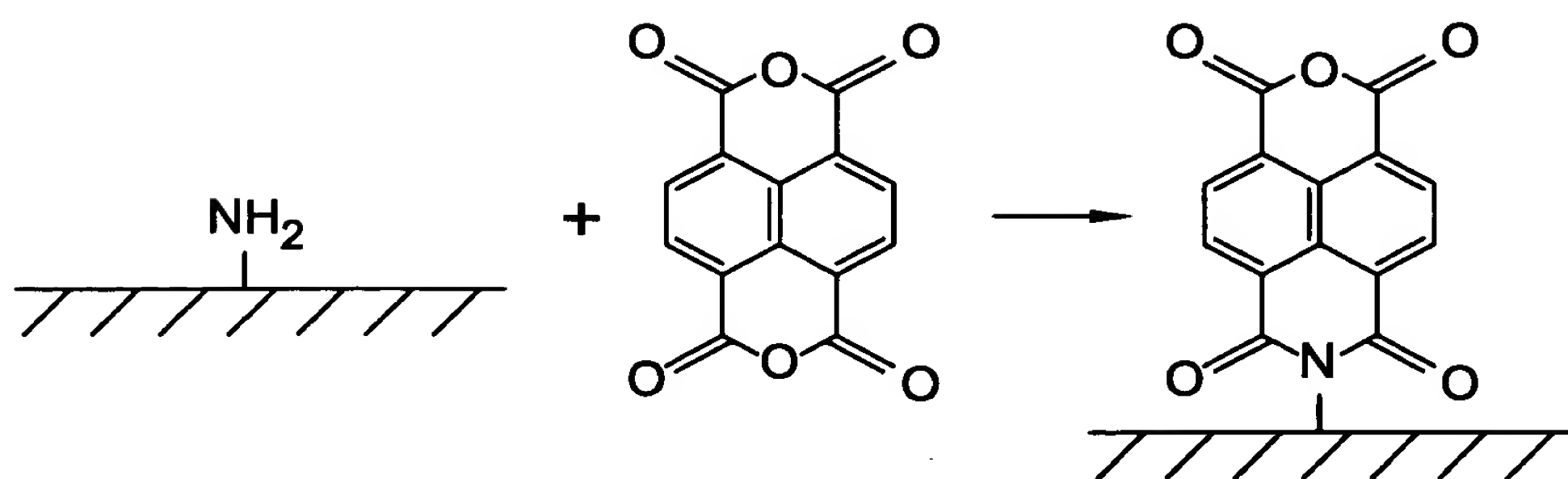


FIG. 5A

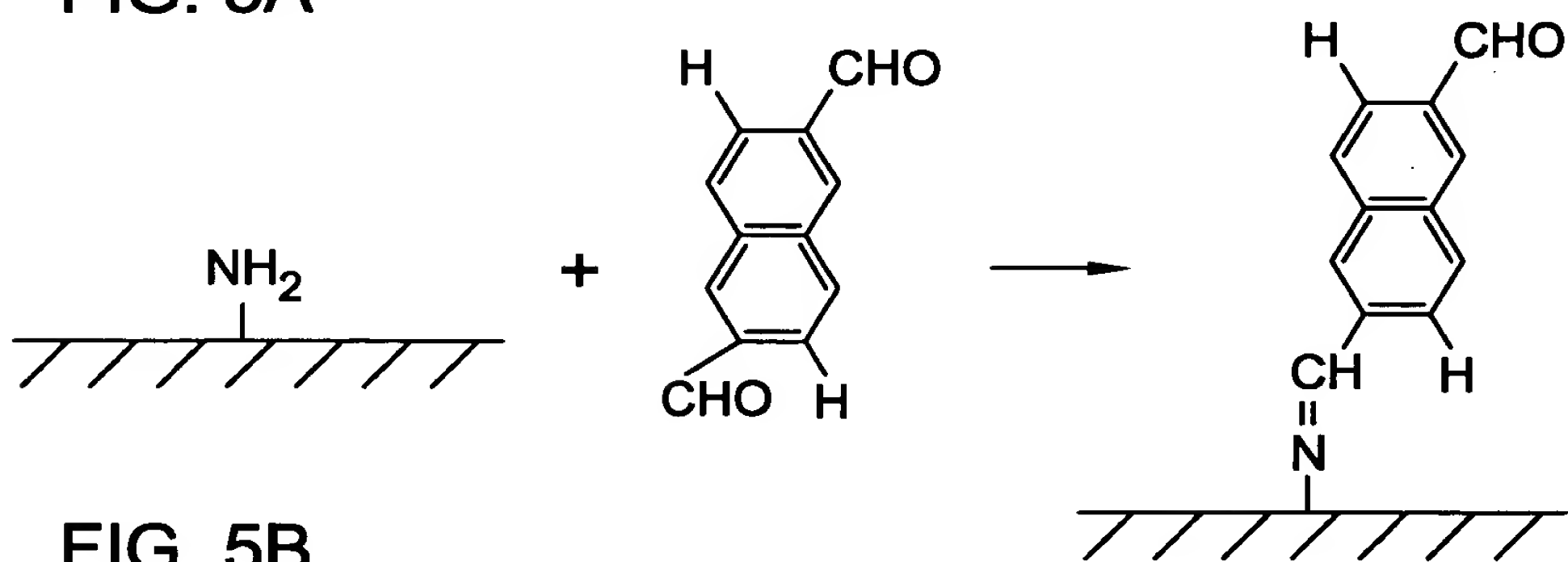


FIG. 5B

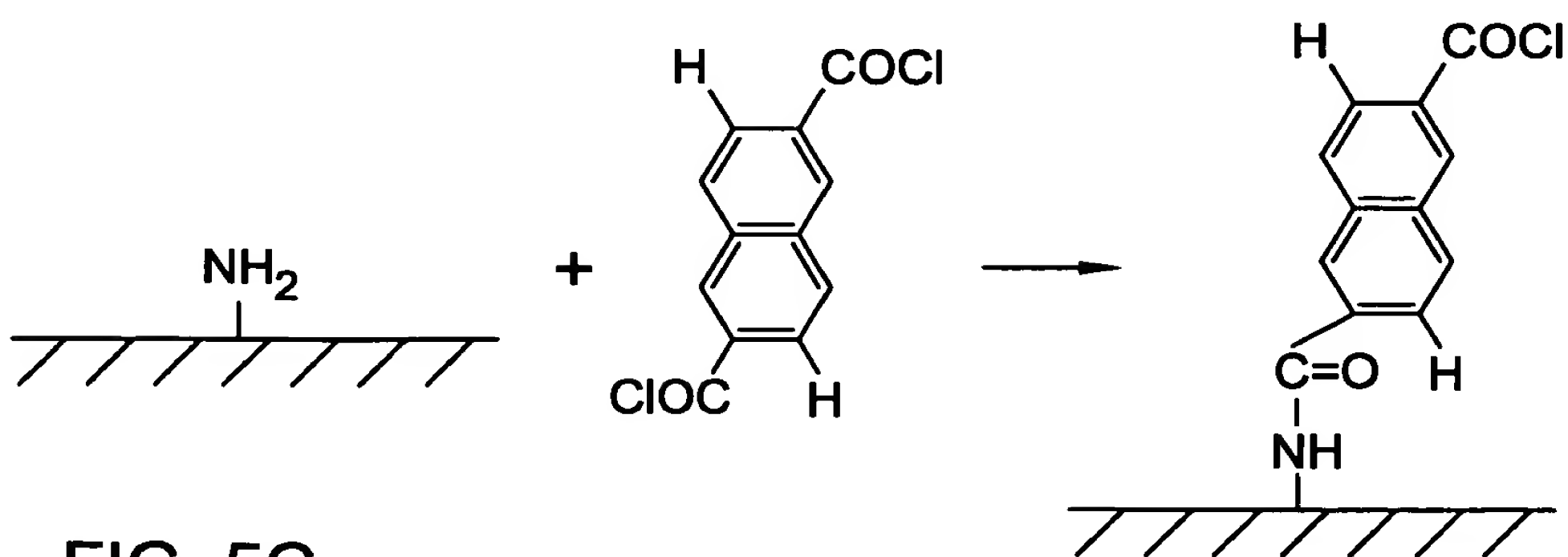


FIG. 5C

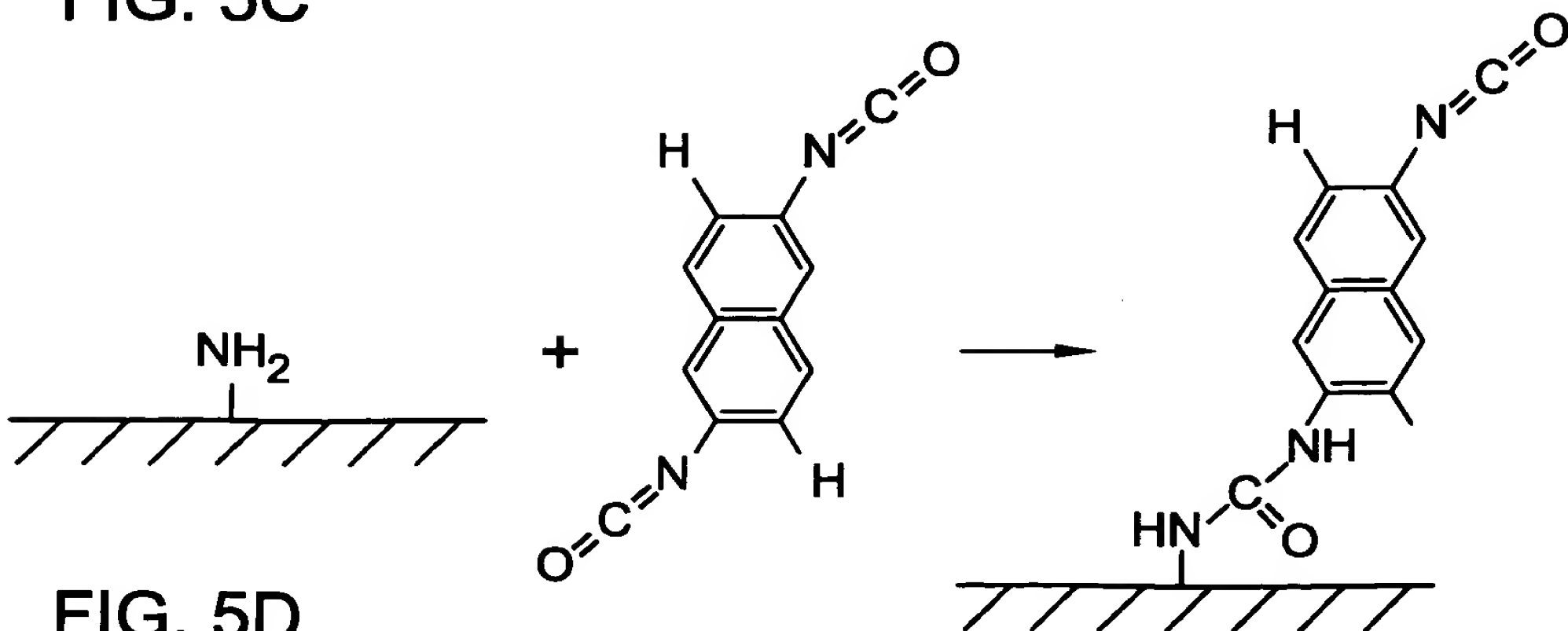
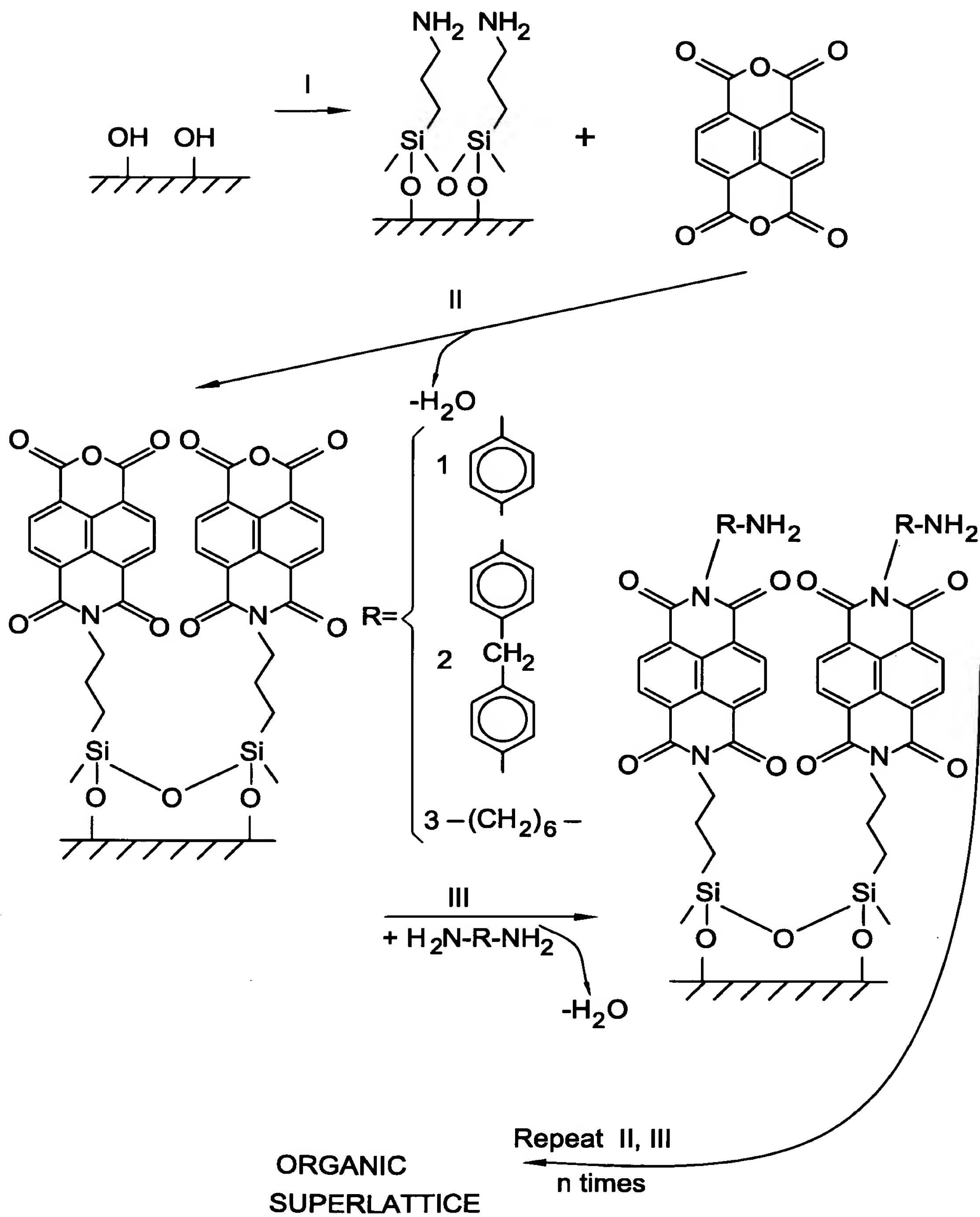


FIG. 5D



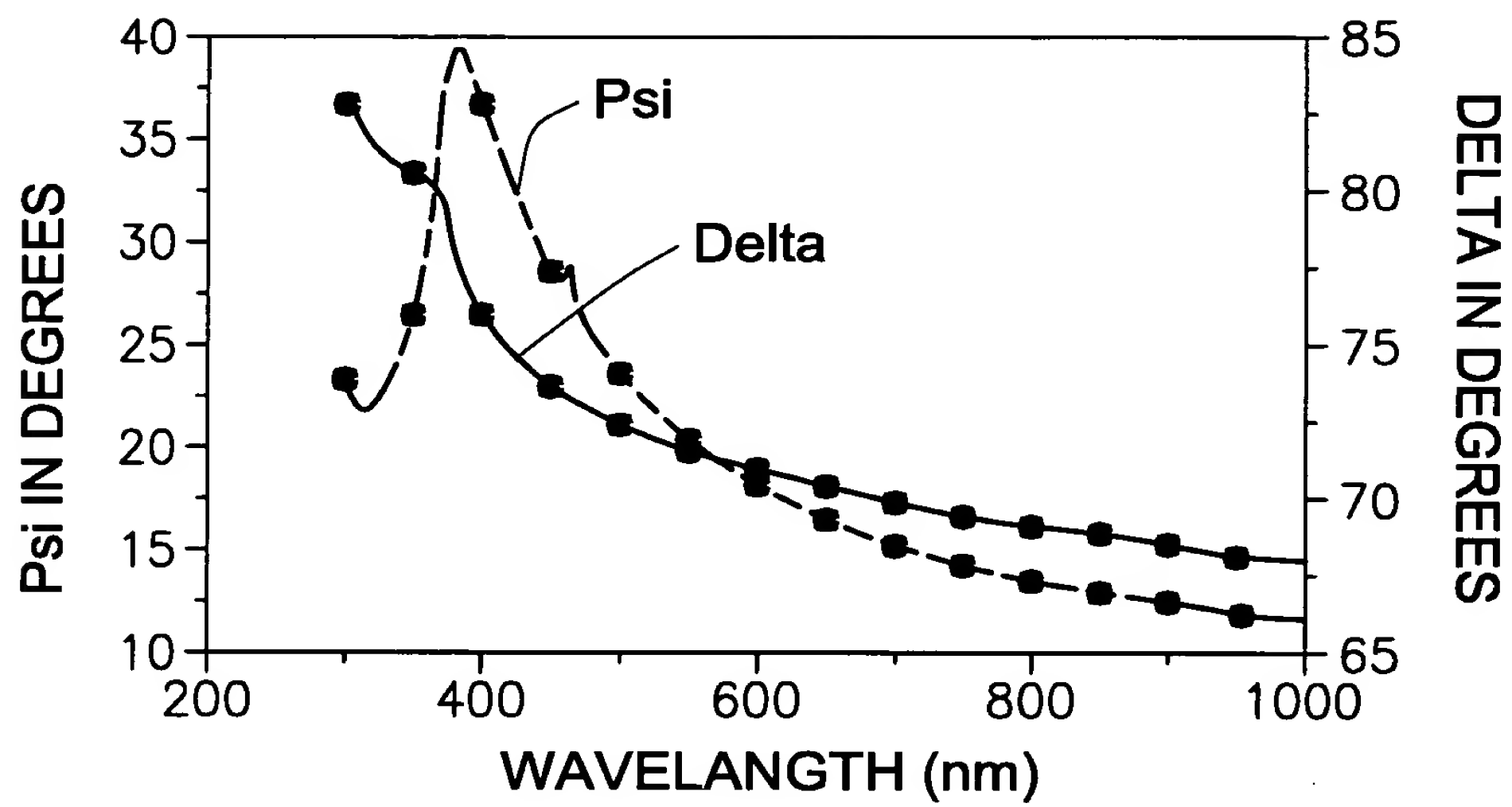
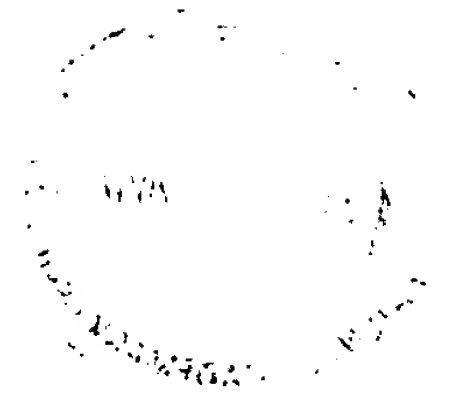


FIG. 7

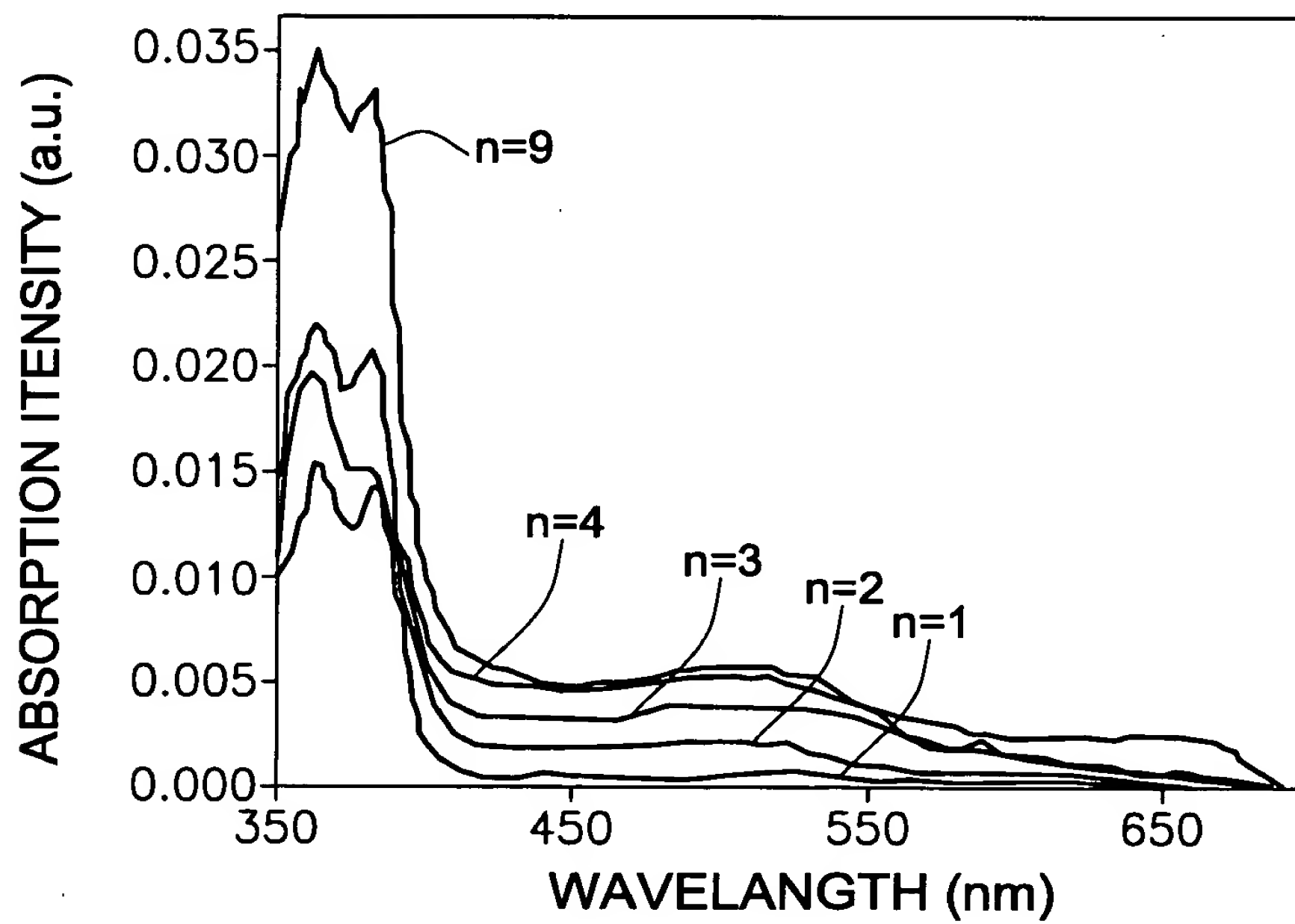


FIG. 8

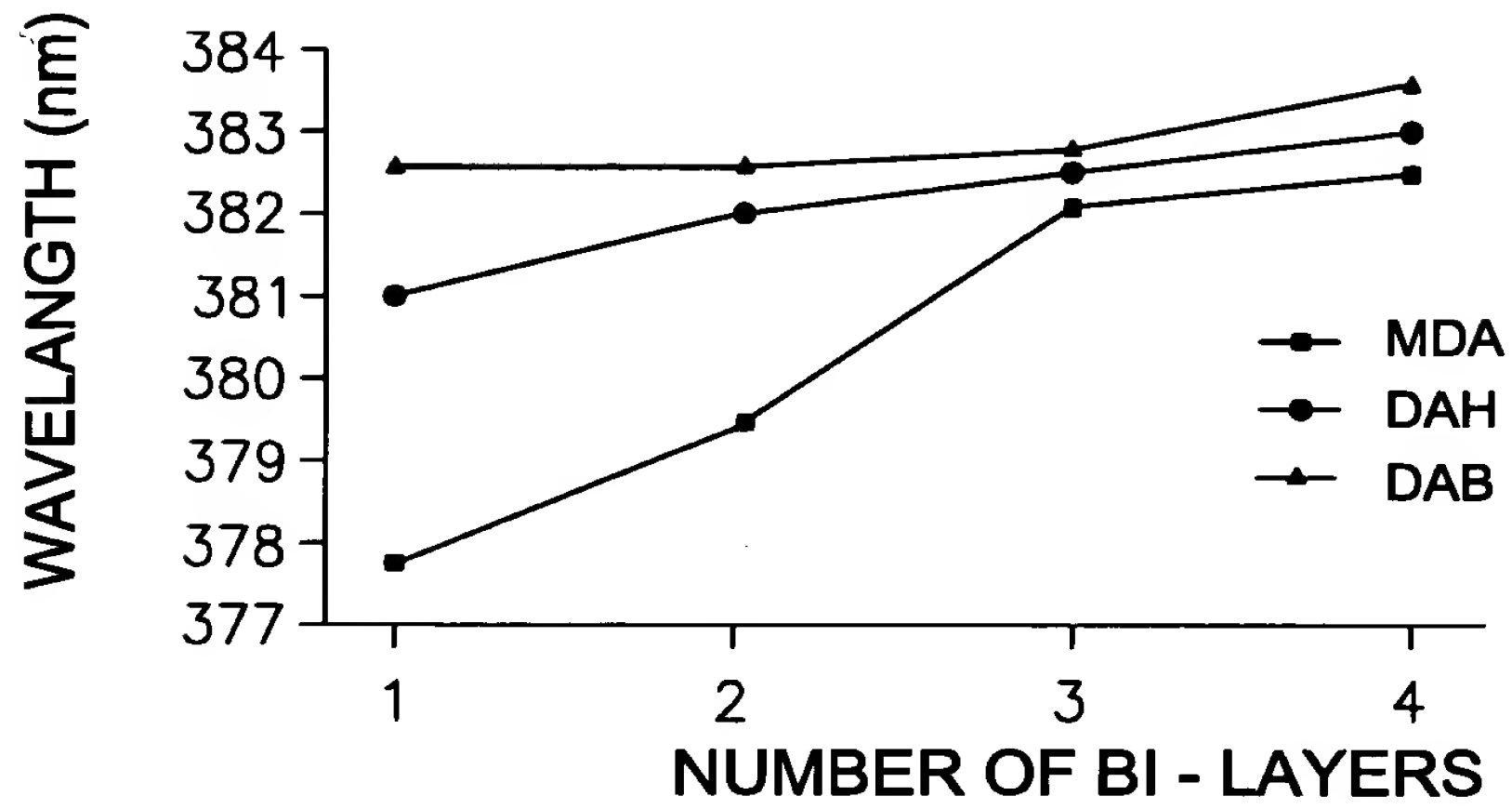
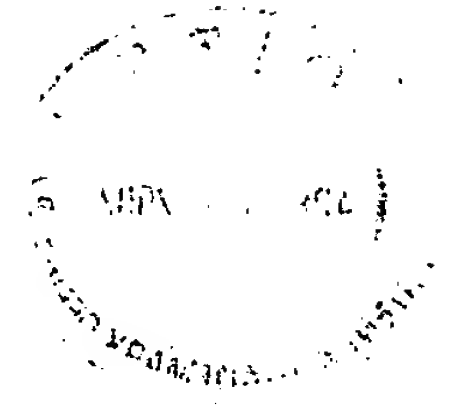


FIG. 9

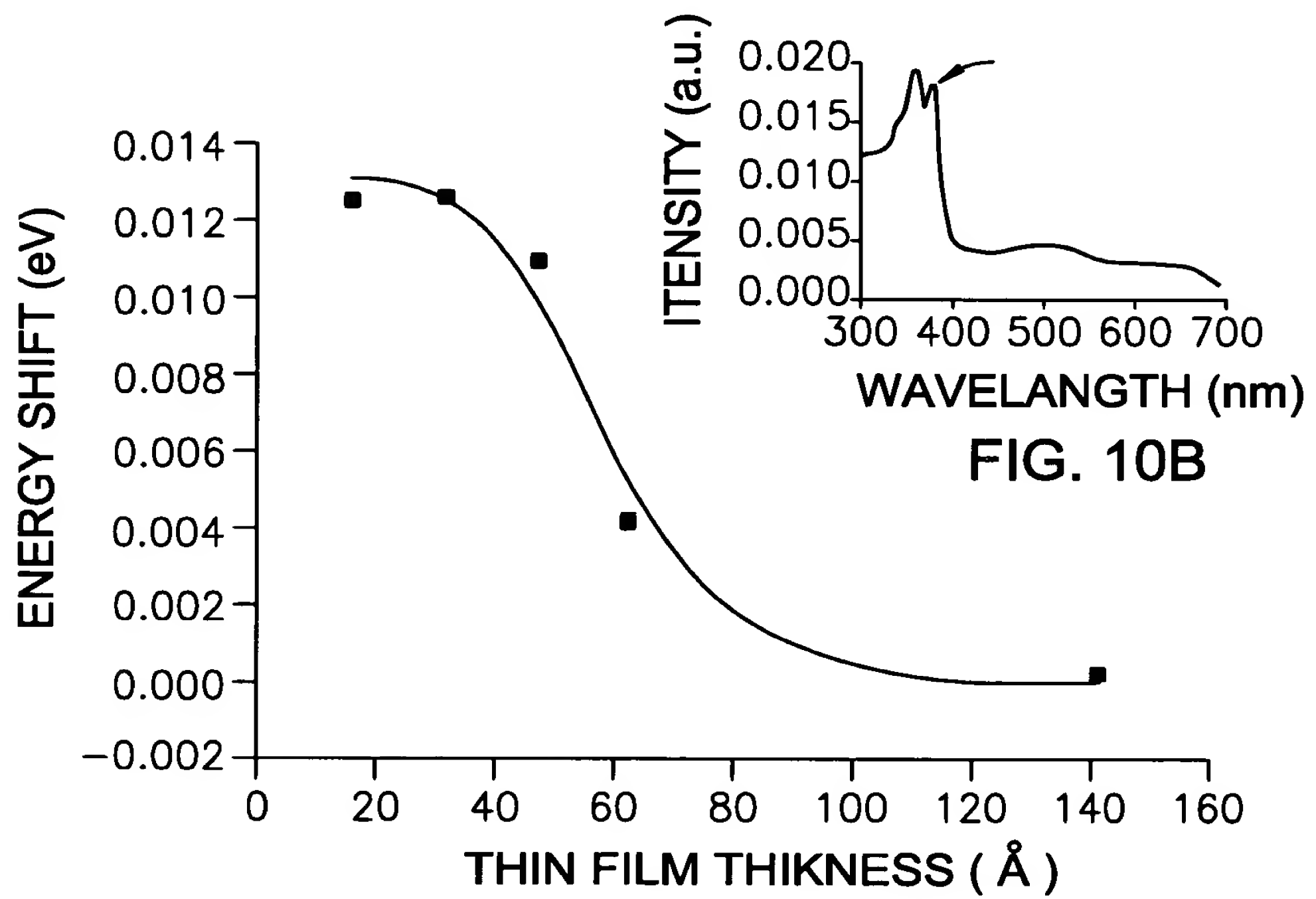


FIG. 10B

FIG. 10A



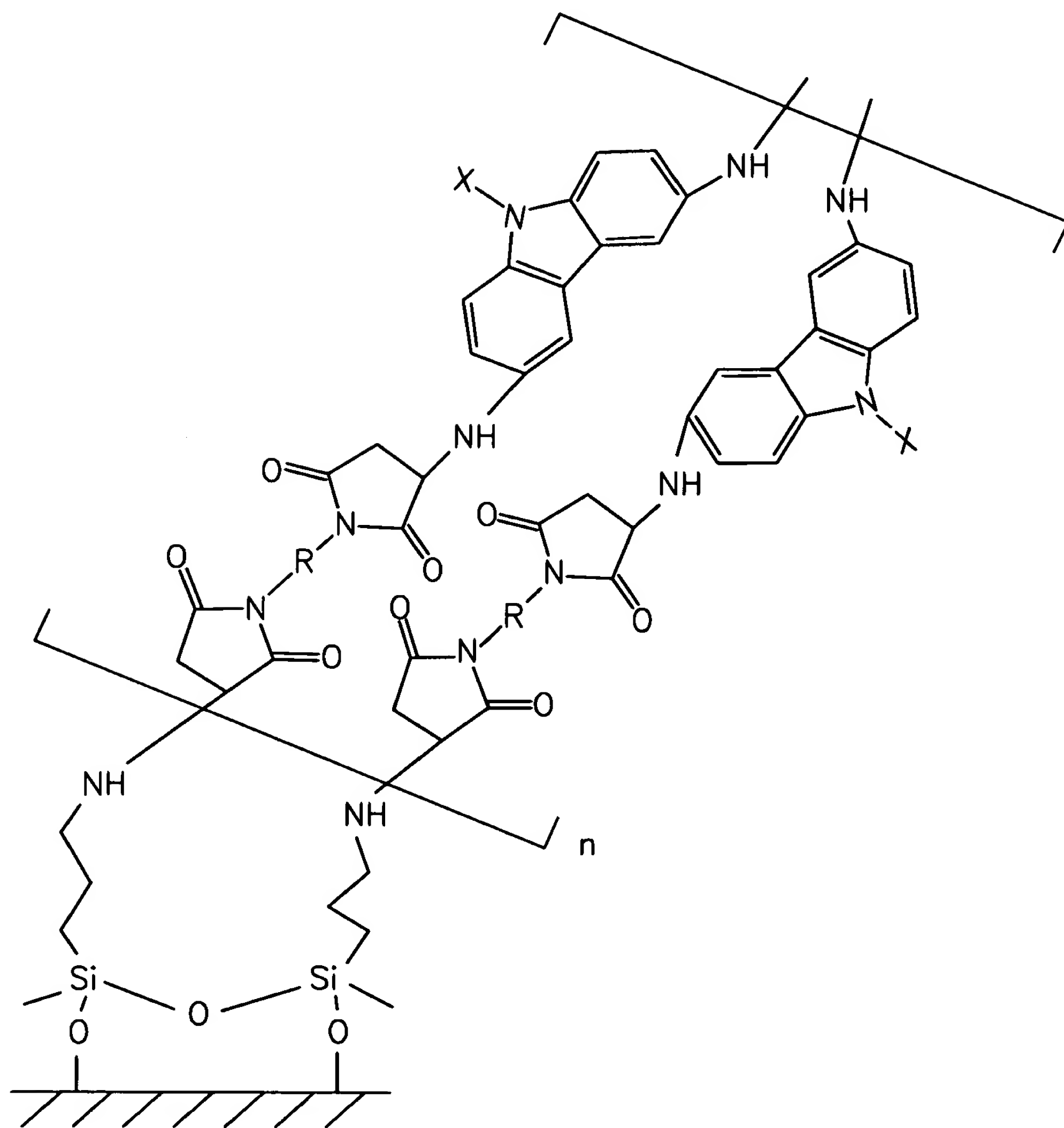
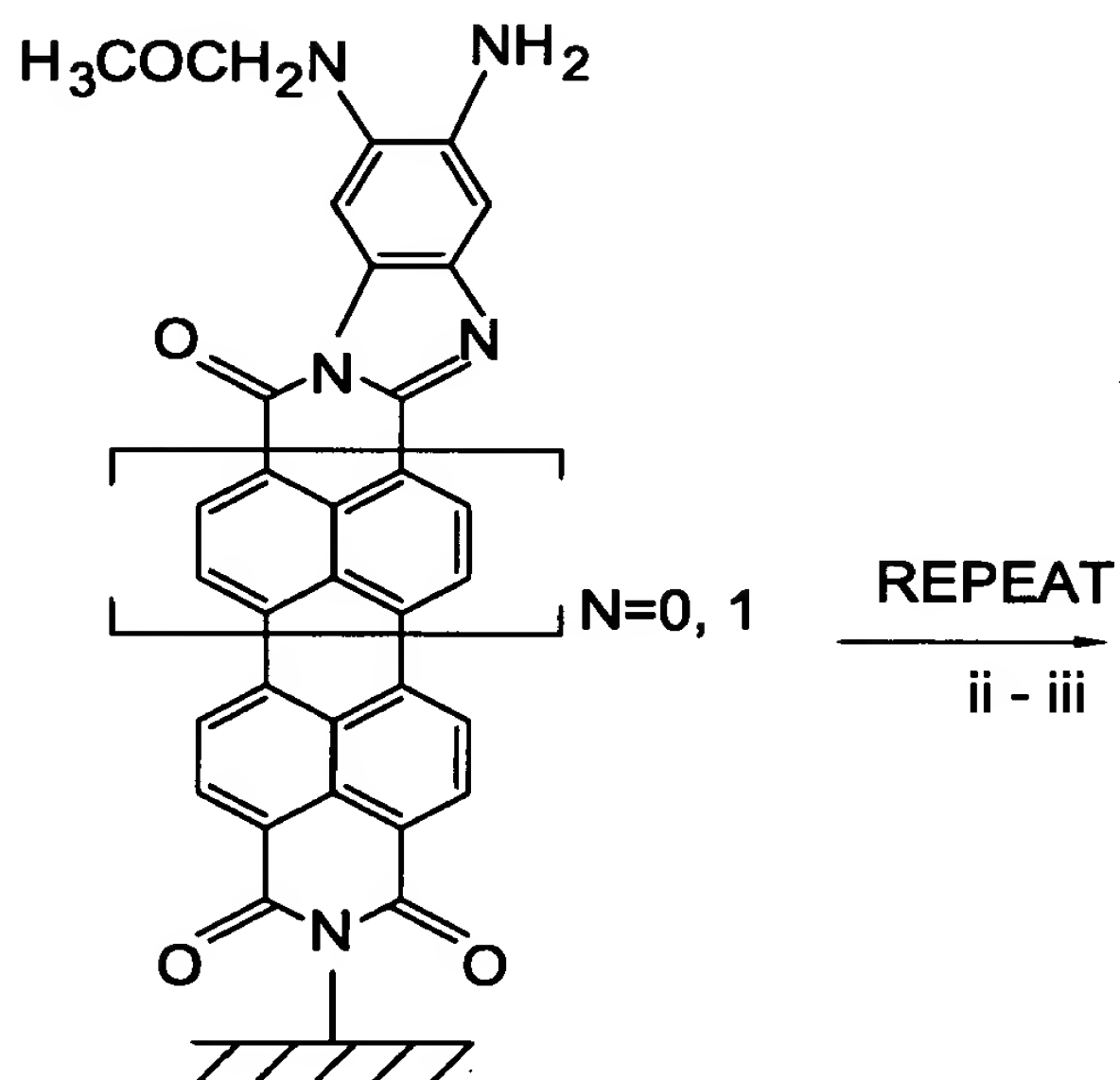
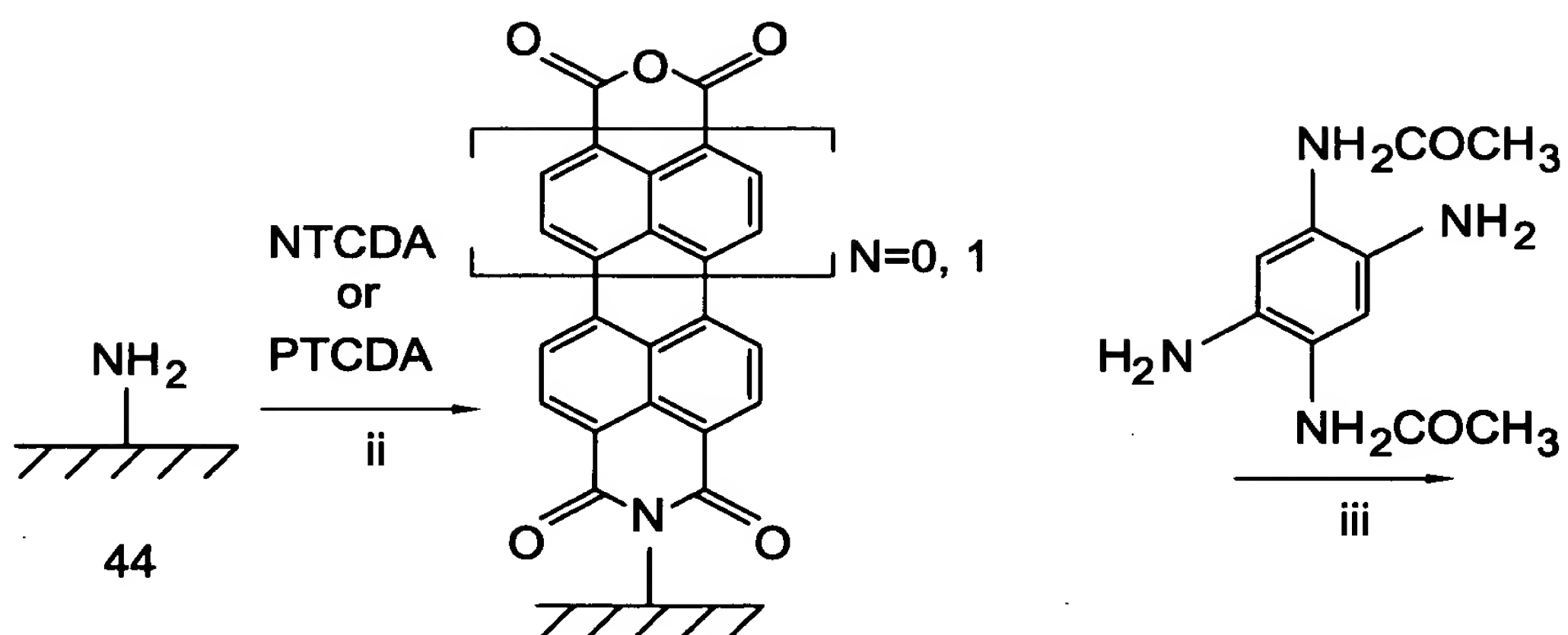
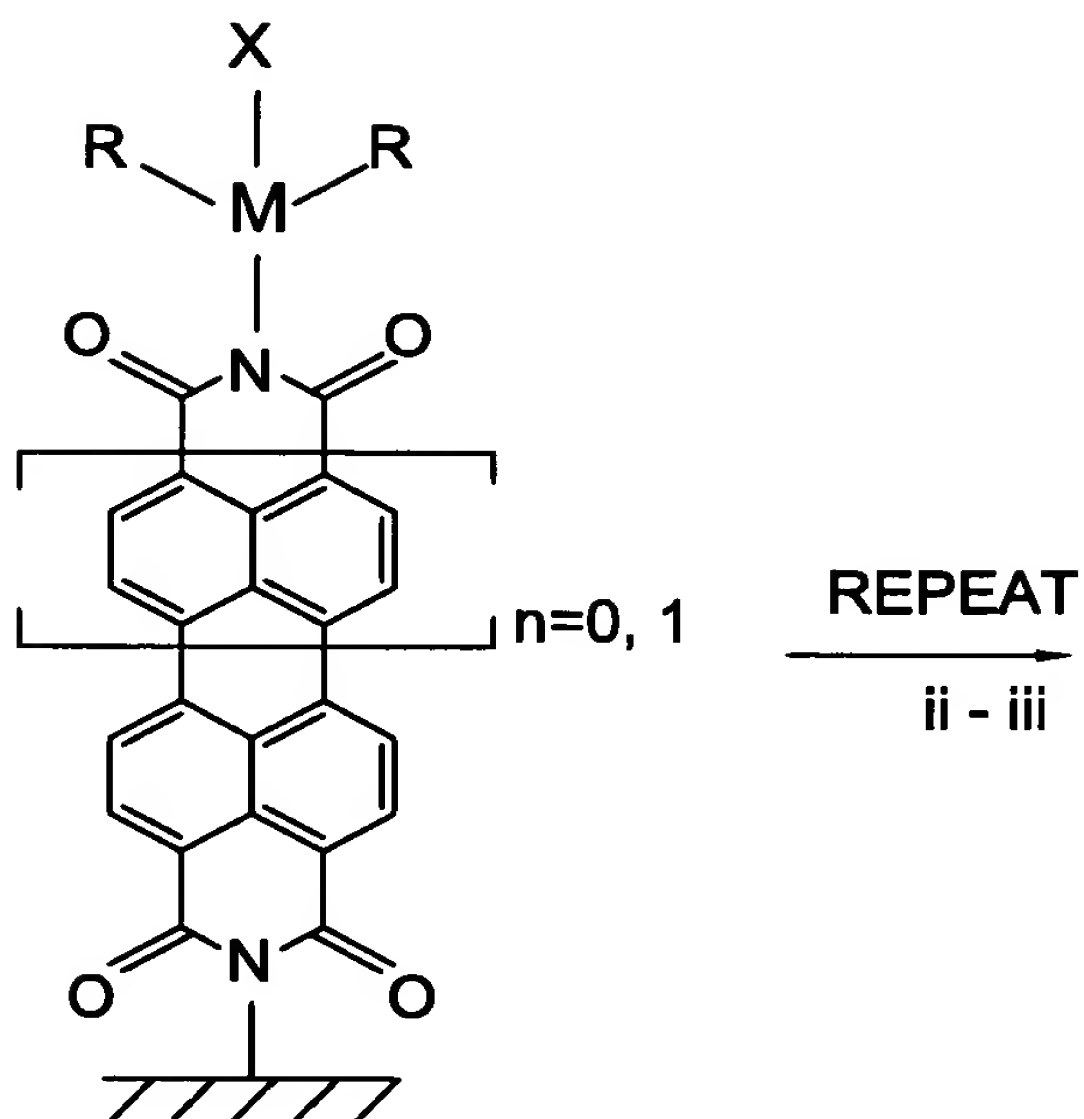
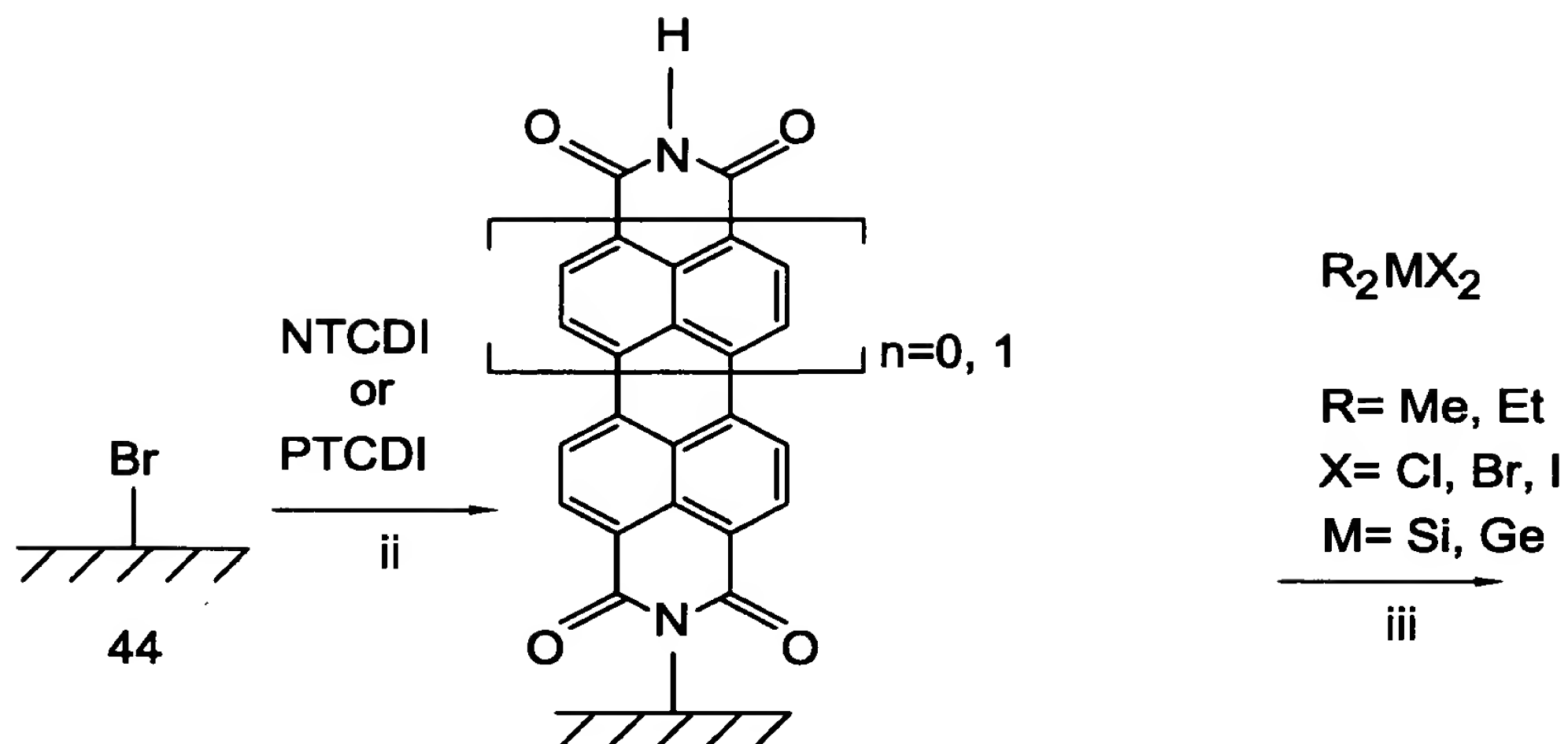


FIG. 11



LADDER STRUCTURE  
CONTAINING  
MULTILAYERS  
P1=[N=0]  
P2=[N=1]

FIG. 12A



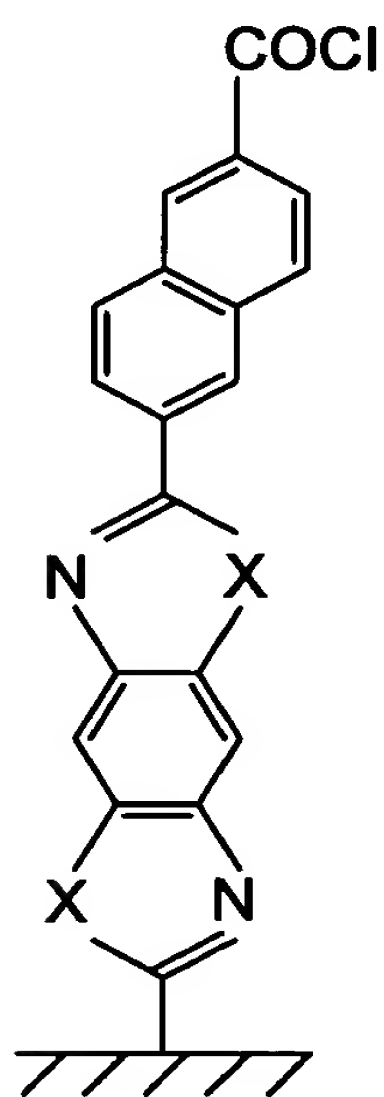
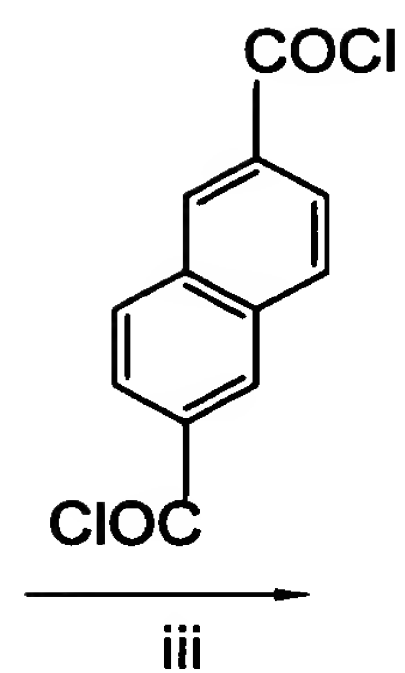
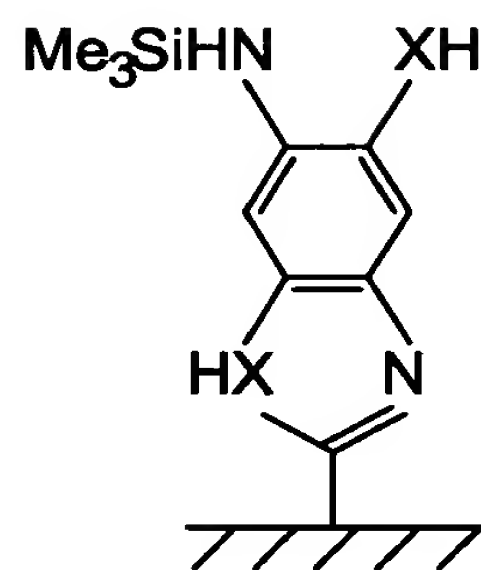
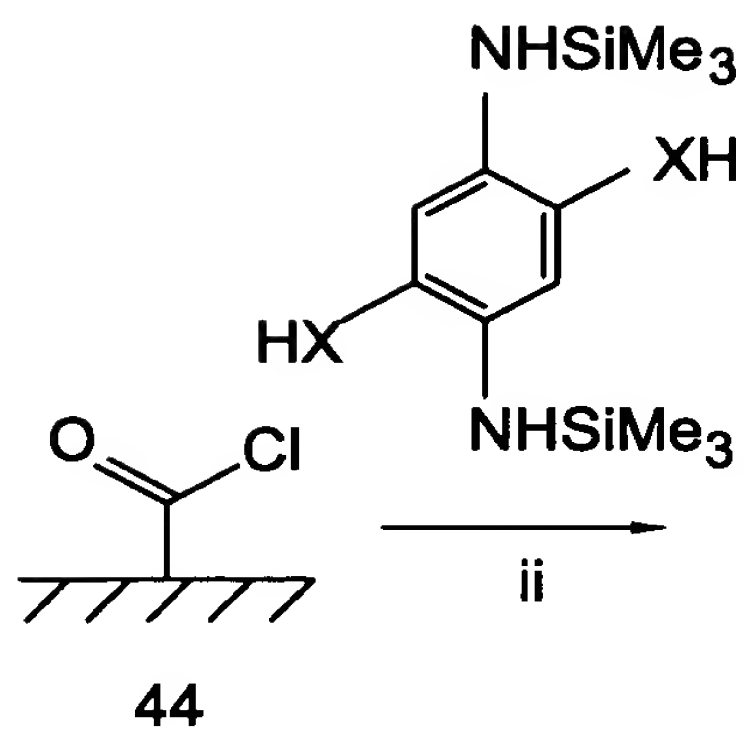
METALLO-ORGANIC  
CONTAINING  
MULTILAYERS

P3= [n=0]

P4= [n=1]

FIG. 12B

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REPEAT  
ii - iii

$\pi$  - CONJUGATED  
MULTILAYERS

P5=[X=O]  
P6=[X=S]

FIG. 12C

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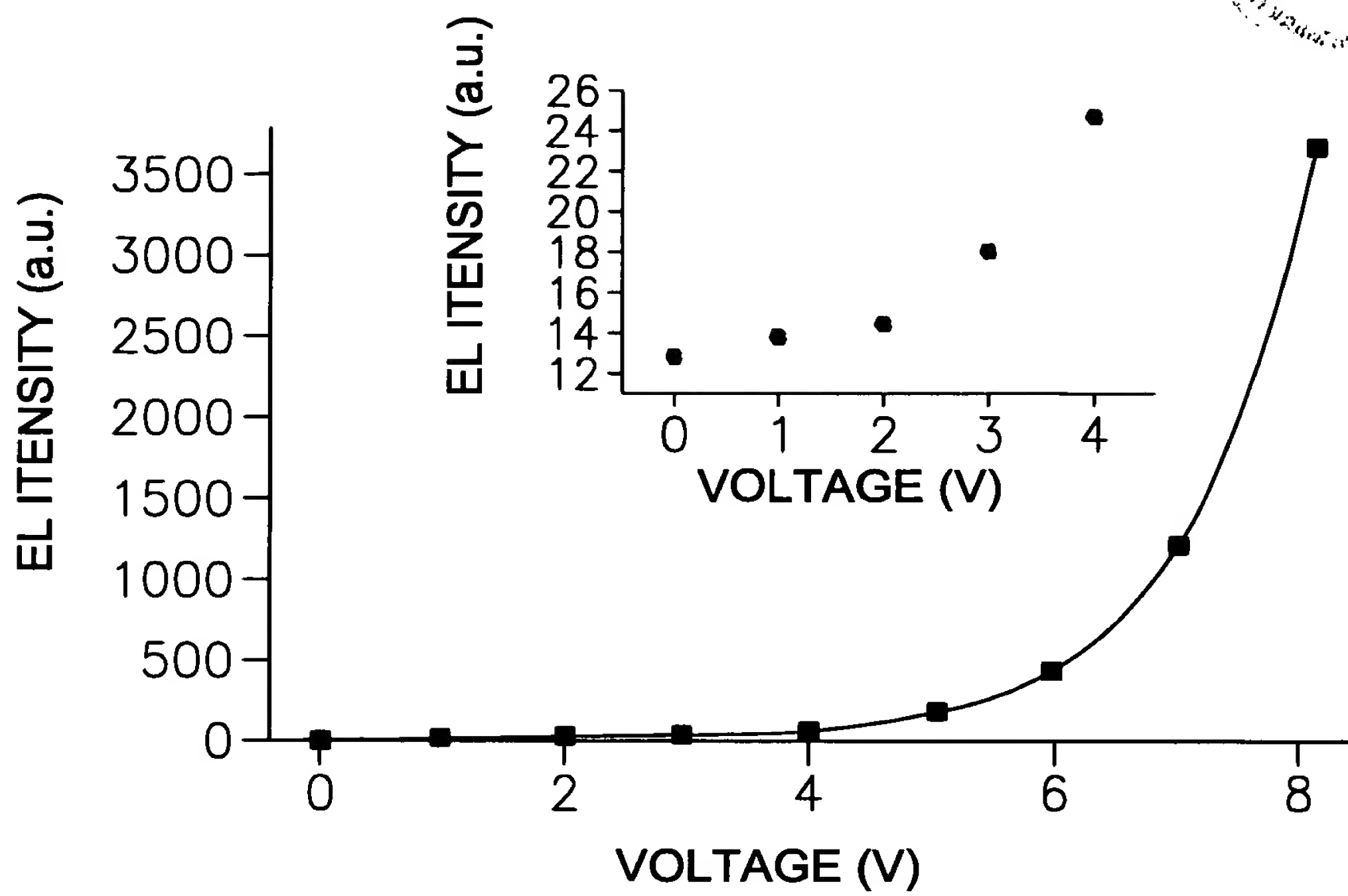


FIG. 13A

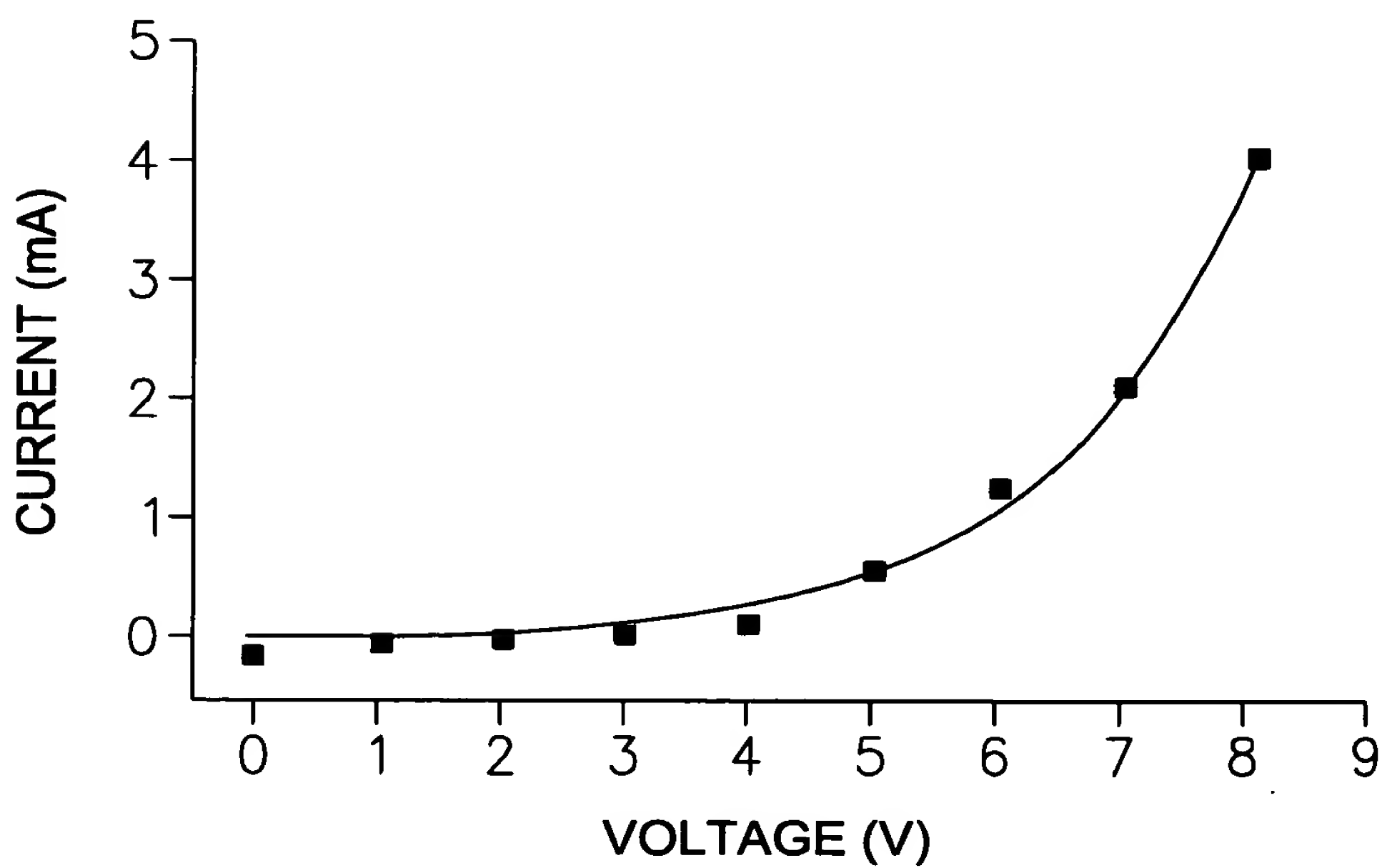


FIG. 13B

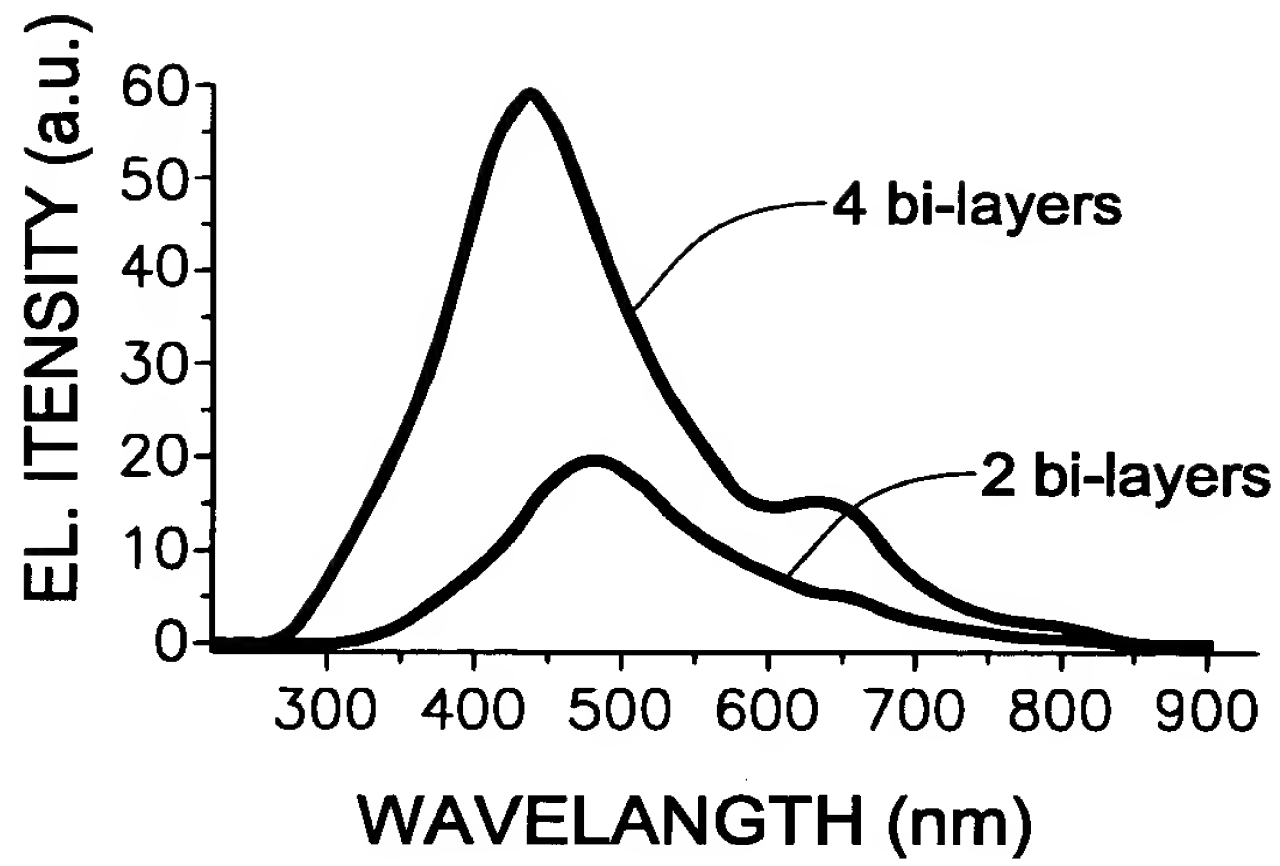


FIG. 14

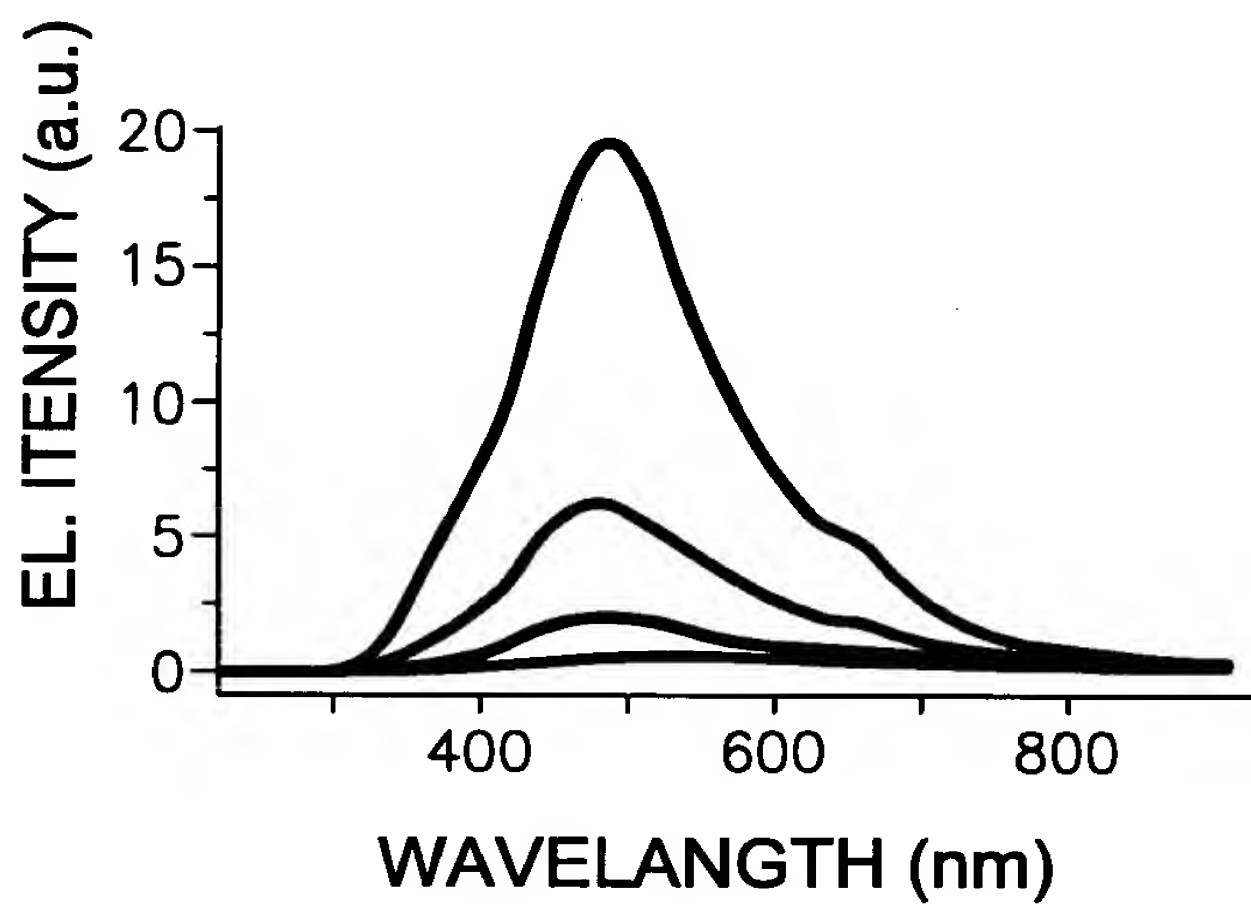


FIG. 15

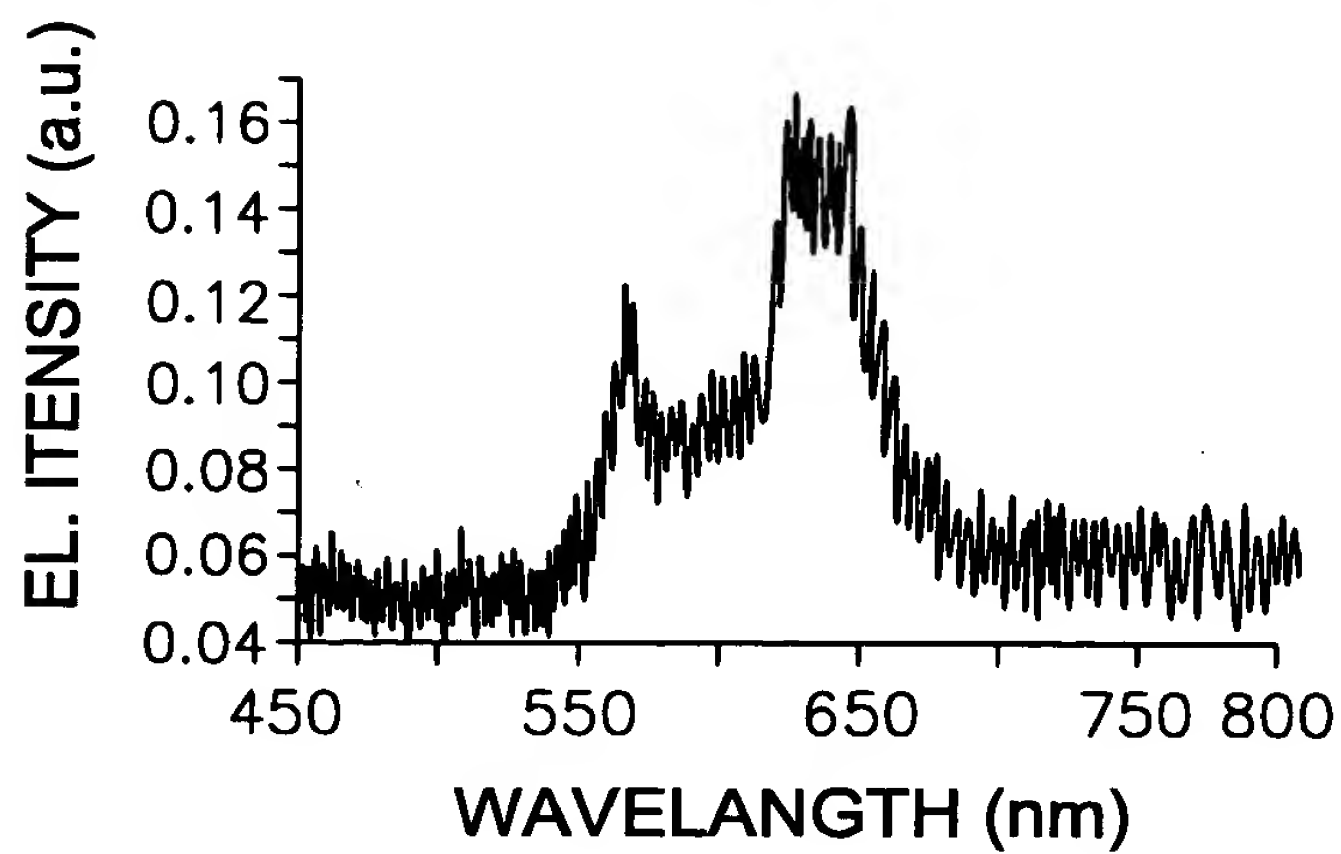


FIG. 16

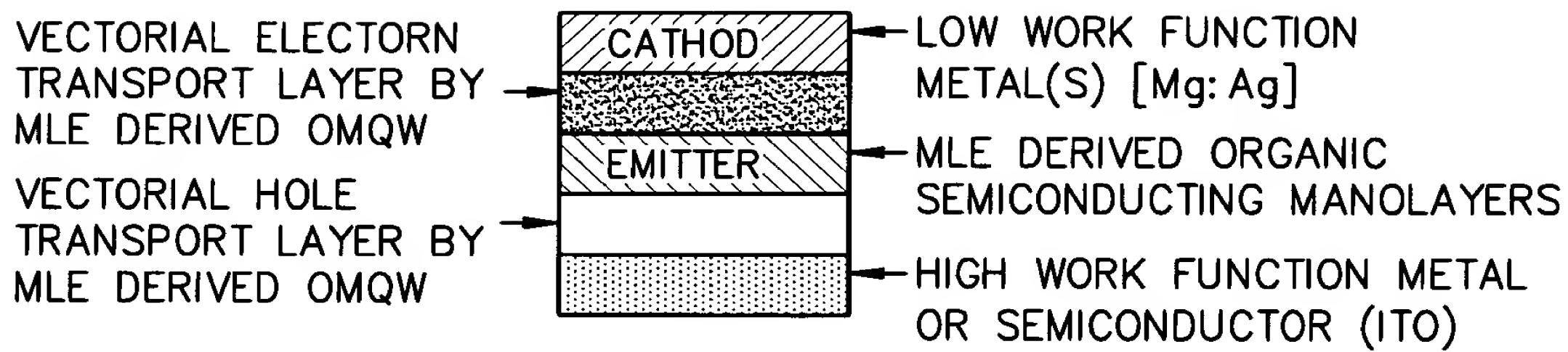


FIG. 17A

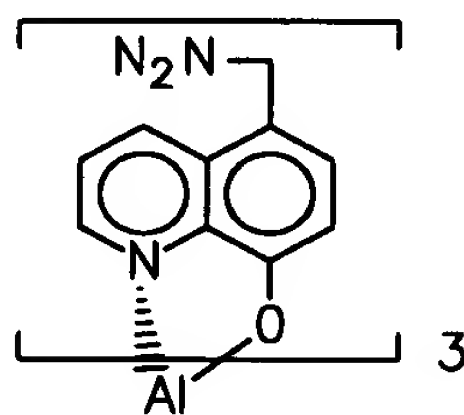


FIG. 17B

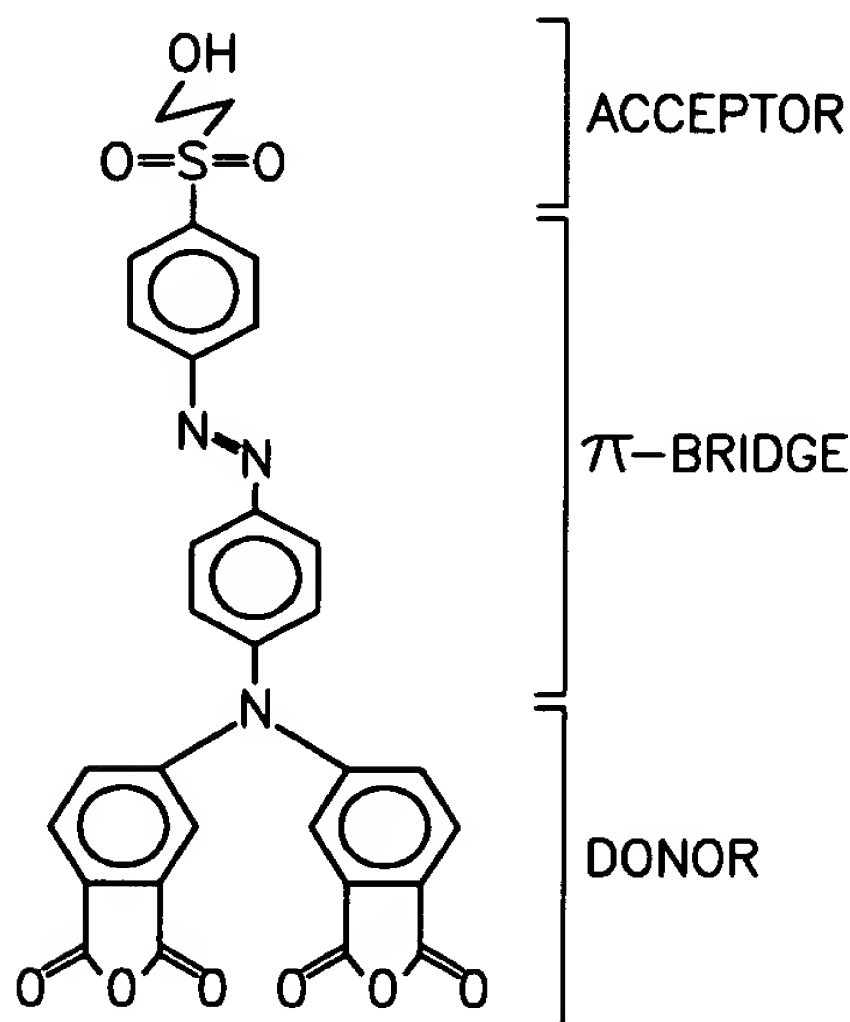


FIG. 18

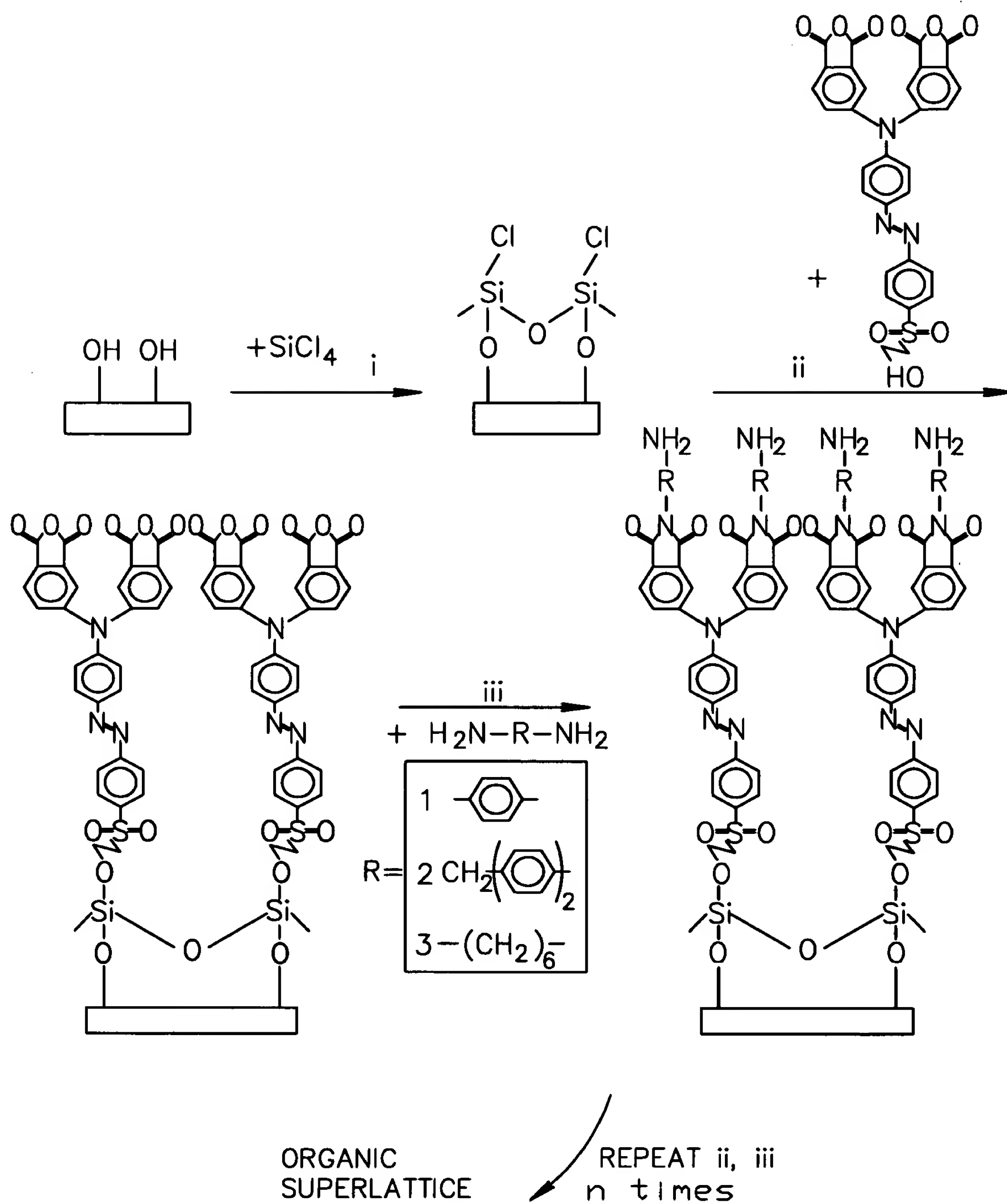


FIG. 19